CMPSC-F265 -A "Data Structures and Algorithms"

Fall Semester, 2019
Suffolk University

Instructor Information

Instructor: Zaihan Yang

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Office Location: Room 8098, 73 Tremont St.

Office Hours: Wed: 1.45pm-2.45pm Fri: 12.30-1.15 or 3pm-4.30pm

Course Information
Meetings: Monday and Wednesday: 12.15pm-1.30pm

Location: Samia Acamemic Center, Room 219

Catalog Description: Includes topics such as strings, stacks, queues, lists, trees, graphs, sorting, searching, hashing, dynamic storage allocation, and analysis of algorithms. Most programming will be done in the Java

Prerequisites: CMPSC F132 (Computer Science II)

Textbook/Course Materials:

Data Structures and Algorithms in Java, by Robert Lafore *(2nd Edition)*

Resources required:

Students should be able to compile and run a Java program. Therefore, a computer with Java installed (preferably 1.7 or later) is needed. Feel free to use your desired text editor or IDE.

Credit Hours: 4

This course follows the Federal Government's Credit Hour definition. *For more information regarding the definition, please see the Suffolk University Syllabus webpage:* http://www.suffolk.edu/syllabus.

Student Engagement Hours

To complete this course successfully, students are expected to dedicate, at a minimum, the following amount of time to the listed activities:[1]

Assignment/Activity	**Engagement Estimate**	**Engagement Hours**
Class attendance	14 weeks x 2.5 hours	35 hours
Review and reading (book and slides)	14 weeks x 4 hours	56 hours
Homework	13 x 5 hours	65 hours
Midterm exam preparation	12 hours	12 hours
Final exam preparation	18 hours	18 hours

Total engagement hours: 186

Instructor's Additional Course Description:

In the course which is a part of the core curriculum in computer science, we will discuss the essential data structures and algorithms. Specifically, we will discuss abstract data types such as linked lists, stacks, queues, hash tables, trees (search trees and binary heaps) and graphs. We also study search and sort algorithms, and we discuss time and space complexity of algorithms.

Expected background:

- Ability to program at intermediate level. The students should have an understanding of (built-in, primitive) data types, arrays, loops, conditionals, functions, and some basic understanding of object-oriented programming (classes and objects, constructors, static and instance variables and methods).
- This course is taught in Java. We will not be doing intensive coding, and we will be using basic language syntax. A very brief overview of Java will be given, but you should be familiar (or familiarize yourself) with the language.

[1] The estimate of engagement hours takes into account university holidays and breaks

Course Goals & Learning Objectives:

GOALS	OBJECTIVES	ASSESSMENTS
Upon successful completion of this course, students should be able to know/understand:	**Upon successful completion of this course, students should be able to:**	**How the student will be assessed on these learning objectives:**
• Understand the purpose, concepts and methods of algorithm analysis • Know a broad range of fundamental algorithms (searching, sorting, algorithms on trees and graphs) and understand their complexity, and performance tradeoffs • Understand fundamental abstract data structures, their various implementations and algorithmic tools and approaches for working with them	• Implement and utilize fundamental algorithms and data structures in their programs • Choose data structures and algorithms best suited for the programming task that needs to be solved • Analyze and understand complexity and performance characteristics of their code	• Understanding of the material and practical skill in implementing the concepts studied as working software solutions will be further assessed with weekly programming assignments. • The final assessment of general understanding, command of the material as well as practical skill is performed via Midterm and Final examinations.

Learning Assessment

Homework:

There will be weekly homework assignments. The Java programs should be submitted electronically via Blackboard. Homework normally will be posted on a Sunday midnight, and be due on the next Sunday's midnight.

You are expected to independently finish your homework. Please strictly follow the problem requirements, and submit your work in proper style. To appeal a homework grade, please contact the instructor within one week from the return date, and provide explanation of why you believe the grade is in error.

Quiz:

You will have quizzes roughly every two weeks on Wednesday's class. Most of the problems would be conceptual level understanding problems, like writing short answers to questions, true/false, multiple choice, program errors identification and fixing, showing out program's results and etc.

Exams:

There will be one 75-minute in class Midterm exams and a 120-minute final exam.

The final exam is comprehensive. All exams are closed book/notes, and no electronic devices are allowed.

Grading and Evaluation

We have the late grading policy for all homework submissions that says you will have 10 points off per day late. All homework and exams are subject to the honor code. Any kind of plagiarism is not tolerated.

Grades will be computed as follows.

Homework	40%
Lab attendance and Exercises	5%
Quizzes	5%
Mid-term Exam 1	15%
Mid-term Exam 2	15%
Final Exam	20%

Course Schedule:

Week	Topics	Reading from textbook
Week 1 (Sept 2)	Introduction, Arrays, Array operations	Ch. 1 Ch. 2, 33-64
Week 2 (Sept 9)	Linear Search, Binary Search, Analysis of Algorithms	Ch. 2, 70-73
Week 3 (Sept 16)	Elementary sorting algorithms, Introduction to Stacks	Ch. 3: 77-108 Ch. 4: 115-131
Week 4 (Sept 23)	Stacks examples, Queues, Priority Queues	Ch. 4: 132-140 Ch. 4: 143-173
Week 5 (Sept 30)	Linked Lists, Introduction and Implementation, Doubly Linked List	Ch. 5: 180-245
Week 6 (Oct 7)	Recursive Algorithms, MergeSort, QuickSort	Ch. 6: 251-293 Ch. 7: 333-357
Week 7 (Oct 14)	Binary tree and basic operations	Ch.8: 365-390
Week 8 (Oct 21)	Mid-term review and Mid-term	
Week 9 (Oct 28)	Binary Search tree, and more on trees	Ch. 12: 579-599
Week 10 (Nov 4)	Intro to Heap, HeapSort, Algorithms on Heaps	Ch. 12: 600-612
Week 11 (Nov 11)	Hash tables	Ch. 11: 519-571 Ch. 13: 615-660

Week 12 (Nov 18)	Intro to Graphs; Weighted Graphs; Search on Graph (BFS and DFS) Mid-term 2 review	Ch. 13: 615-660 Ch. 14: 669-707
Week 13 (Nov 25)	Mid-term 2	Ch. 14: 669-707
Week 14 (Dec 2)	Spanning Tree; Shortest Paths	
Week 15 (Dec 9)	Shortest Path; Cycle Detection; Review session	
Final Exam (TBA)		

Suffolk University Syllabus Policies

This this course adheres to policies and procedures that apply to all Suffolk courses with regard to disability accommodation, academic misconduct, academic grievance, attendance, and credit hour compliance. The university policies can be found here: www.suffolk.edu/syllabus.

Course Policies:

Make-up Policy:

Make-up exams are only given for excused absences. Students must consult with the instructor as soon as possible, preferably before the start of the exam.

Class Cancellations/Schedule Adjustments: (Expected and Unexpected)

In the event that the university cancels classes, such as for severe weather, or class is canceled for other reasons, students are expected to continue with readings as originally scheduled. Any assignments scheduled during those missed classes, such as an exam or paper, are due at the next class meeting unless other instructions communicated via email or Blackboard announcements.

Lecture Participation/Attendance Policy:

Attendance and participation at class are mandatory parts of this course. Absences and Attendance Policy from the Student Handbook: www.suffolk.edu/studenthandbook

Student Resources

The university provides a range of academic, counseling, medical and administrative student support services. To learn more, explore this webpage: www.suffolk.edu/syllabus

Some of the things you will learn about at this site are:

The Center for Learning and Academic Success (CLAS) offers academic coaching and tutoring in math, writing and English, and many other CAS and SBS courses. Students may join study groups, participate in drop-in services, or make appointments with tutors and academic coaches to reinforce course content, develop writing, and strengthen effective study habits. For a complete review of free

services, workshops and online resources go to http://www.suffolk.edu/syllabus or visit CLAS on the 9th floor of 73 Tremont Street.

Statement on Physical/Emotional Health

A range of issues can cause barriers to learning, such as strained relationships, increased anxiety, health issues, alcohol/drug problems, feeling down, difficulty concentrating, lack of motivation or feeling ill. These concerns or other stressful events may lead to diminished academic performance or may reduce your ability to participate in daily activities. University resources can help you address these and other concerns. You can learn more about Suffolk's broad range of medical and confidential mental health services at http://www.suffolk.edu/syllabus

Statement on Accommodations for Students with Disabilities

If you anticipate issues with the format or requirements of this course, please meet with me—I would like to discuss ways to ensure your full participation in my classroom. If you determine that you need formal, disability-related accommodations, it is very important that you register with the Office of Disability Services (located at 73 Tremont Street, 9th floor, 617-573-8034) and notify me of your eligibility for reasonable accommodations. Discussions with ODS are confidential. I will not know of your needs unless you tell me. We can then plan how best to implement your accommodations. For up to date info go to www.suffolk.edu/disability

Statement for International Students

International Student Services Office (ISSO), a part of the Center for International Programs and Services, provides comprehensive support to international students. Follow the link (http://www.suffolk.edu/syllabus) for location and information.

University attendance policy: http://www.suffolk.edu/syllabus

Academic Misconduct Policy: You are required to abide by the Academic Misconduct Policy which may be viewed on line at http://www.suffolk.edu/syllabus

Academic complaints and academic grievances information can be found at:

http://www.suffolk.edu/syllabus